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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/255,963	02/23/1999	PETER X. MA	UMJ-101-A	9213

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EXAMINER

KAUSHAL, SUMESH

ART UNIT PAPER NUMBER

1636

DATE MAILED: 05/28/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/255,963

Applicant(s)

MA, PETER X.

Examiner

Sumesh Kaushal Ph.D.

Art Unit

1636

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20,22,23,25-30,32-38 and 40-55 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☐ Claim(s) _____ is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Applicant's response filed on 03/18/03 has been acknowledged.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/18/03 has been entered.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The references cited herein are of record in a prior Office action.

► Applicants are advised to follow Amendment Practice under revised 37 CFR §1.121 (<http://www.uspto.gov/web/offices/pac/dapp/opla/preognotice/revamdtprac.htm>). Each amendment document that includes a change to an existing claim, or submission of a new claim, **must include a complete listing of all claims** in the application. After each claim number, the status must be indicated in a parenthetical expression, and the text of each claim under examination (with markings to show current changes) must be presented. The listing will serve to replace all prior versions of the claims in the application.

Claims 1-20, 22-23, 25-30, 32-3 and 40-55 are pending and are examined in this office action. Claim 32 is objected to because it depends upon a canceled claim 31.

Claim Rejections - 35 USC § 112

Claims 1-20, 22-23, 25-30, 32-38, 40-55 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention for the same reasons of record as set forth in the office action mailed on 09/09/02.

Claims 1, 11, 23, 34 and 52 are indefinite because it is unclear whether the medium into which the hydrogel system is introduced is different from the medium or mixture into which the three-dimensional hydrogel cross-linking was performed.

Claim Rejections - 35 USC § 103

Claims 1-20, 22-23, 25-38 and 40-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Draget et al (Carb. Poly. 14:159-178, 1991), Martisen et al (Biotech. Bioeng. 33:79-89, 1989) and further in view of Hauselmann et al (US Patent 5,658,343) and Cao et al (Book of abstracts, BIOT-212, 211thACS National Meeting, New Orleans 1996) for the same reasons of record as set forth in the office action mailed on 09/09/02.

Draget et al teaches the formation of a gel consisting of mixing 15mM CaCO_3 with sodium alginate solution, then adding 30mM GDL, resulting in a final gel of pH 7 (see, e.g., pg 161, para. 2) only to avoid formation of acidic gels (page 163, para.3). Draget et al also teach that the sodium alginate can be substituted with alginate derived from *Marocystis pyrifera* or *Laminaria hyperbores*, thus altering the viscosity of the gel (pg 161, Table 1; pg 173); and that the dimensions of the gel (e.g. thickness and diameter) are largely a function of the dimensions of the mold into which they form, and can thus be easily modified by one of ordinary skill in the art. Furthermore, maximum gel strength was reached when Ca^{2+} concentration was equivalent to the amount of guluronic acid residues and syneresis become prominent when the calcium contents exceeded this value (page 175, fig-13, page 177 para.3). Thus Draget clearly teaches that variation in calcium ion concentration results in the formation of hydrogels with distinct characteristics.

Martisen teaches that physical properties of beads strongly are dependent upon the composition sequential structure and molecular size of the polymers. The cited art teaches that beads with the highest mechanical strength, lowest shrinkage, best stability towards mono-valent cations and highest porosity were made from alginate with contents of L-guluronic acid higher than 70% and average length of G-blocks higher than 15 (page 79, abstract). In addition, the cited art teaches evaluation of stability of Ca-alginate gel beads towards Na^+ ions by transferring gels beads to solutions containing different concentrations of CaCl_2 (0.001M-0.05M) and measuring the bead volume (shrinkage) every 24 hours for 3 days (page 81 col.1 para.1). The cited art teaches that gel strength and shrinkage is the function of CaCl_2 concentration and gelling time (page 84, col.1-2, fig-7 and 8). In addition the cited art teaches that high gel strength, low shrinkage, high stability towards Na^+ ions and high permeability are the most

advantageous factors for the immobilization of living cells (page 89, col.2). Since the invention as claimed fails distinguish that the medium into which the hydrogel system is introduced is different from the medium or mixture into which the three-dimensional hydrogel cross-linking was performed, Martisen clearly suggests selective size control of a three-dimensional hydrogel system by varying calcium ion concentration into which the hydrogel is introduced.

Hauselmann et al teach the method of producing an alginate gel in vitro comprising cells that produce an extracellular matrix, for implantation in vivo (e.g., col. 1, lines 39-60). Hauselmann et al also teach that the molar ratio of calcium ions to carboxyl groups in the gel determines the amount of cross-linking of the gel, as well as the amount of swelling and thus size of the gel (e.g, col 7, lines 29-46, & Figure 6a,b).

Cao et al teach the method of making and using biodegradable calcium alginate gels with osteoblasts in vitro for implantation in vivo to generate bone growth. The osteoblasts were suspended 1% sodium alginate, then 0.2g of CaSO_4 was added to each ml of the admixt to initiate gel formation. The mixture was injected in nude mice, which results in the new bone formation in the transplanted animals (see abstract)

Thus it would have been obvious to one ordinary skill in the art at the time of filing to modify the teaching of Draget and Martisen by introducing cells (osteoblasts) as taught by Hauselmann and Cao to the Ca-alginate hydrogels composition. One would have been motivated to do this to utilize the gel as a scaffold for cell growth and differentiation for tissue engineering. It would have been further obvious in view Martisen to control the hydrogel shrinkage or swelling by transferring the hydrogels into the solutions that contain different concentration of calcium ions. One would also have been motivated to alter the calcium ion concentration and the ratio of calcium ions to alginate carboxyl groups in order to controlling the amount of gel swelling and shrinkage. One would have been motivate to control hydrogel shrinkage and swelling because these characteristics are highly desirable in tissues engineering for different applications. Therefore, the invention pertaining to specific ion concentrations and the molar ratios that results in hydrogel swelling and shrinking are the result effective variables, which could have been readily determined by one of ordinary skill in the art especially in view of Draget and Martisen. Thus the invention as claimed is prima facie obvious in view of cited art of record.

Conclusion

No claims are allowed.

This is a RCE of applicant's earlier Application No. 09/255,963. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sumesh Kaushal Ph.D. whose telephone number is (703) 305-6838. The examiner can normally be reached on Monday-Friday from 9:00 AM to 5:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Irem.Yucel can be reached on (703) 305-1998. The fax-phone number for the organization where this application or proceeding is assigned as (703) 308-4242. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the patent analyst Zeta Adams, whose telephone number is (703) 305-3291.

S. Kaushal
Patent examiner


JEFFREY FREDMAN
PRIMARY EXAMINER